

# **MAMMOGRAPHY AND THE IMAGING EVALUATION OF BREAST DISEASE**

## **Screening Mammography**

Breast cancer is a common malignancy, which effects about 10% of the female population. Early detection of breast cancer can save many lives. Current methods for screening of breast disease in the general population include a three part program of mammography, breast examination by a doctor or trained nurse, and monthly breast self examination. Periodic mammographic screening of asymptomatic women has been shown to reduce breast cancer mortality. Current studies from multiple ongoing clinical trials suggest that women between the age of 40-50 enjoy the same magnitude of mortality reduction as women who are over age 50. Annual screening mammography, beginning at age 40, is recommended by the American Cancer Society, the American College of Radiology and many other physician organizations. In women with hereditary breast cancer syndromes, or in women otherwise identified as high risk, consider instituting screening mammography at least 5-10 years before the youngest case of breast cancer in the family.

Screening mammography is a radiological examination to detect unsuspected breast cancer at an earlier stage in asymptomatic women. The intent is to separate women into groups with low and high probabilities of breast cancer. The results may assure most women that no significant abnormalities are detected, while others will be informed that an abnormality exists requiring further investigation. It is important that clinical breast examinations are routinely performed in addition to screening mammography, because approximately 10% palpable breast cancers are mammographically occult. In general, it is helpful to perform the clinical breast examination before the mammogram is ordered so that the mammogram can be changed to a diagnostic study if palpable abnormalities are present.

Screening mammography consists of standard craniocaudal and mediolateral oblique views of each breast. The use of the American College of Radiology Breast Imaging Reporting and Data System (BI-RADS) is mandatory for all mammograms and this system can also be used to report the results of other breast examinations such as ultrasound. The BI-RADS categories are as follows:

- Category 0 – Needs additional evaluation
- Category 1 – Negative
- Category 2 – Benign finding
- Category 3 – Probable benign finding
- Category 4 – Suspicious abnormality
- Category 5 – Highly suggestive of malignancy

Categories 4 and 5 are indications for biopsy, while Category 3 lesions are most often managed by follow up imaging examinations in six months limited to the breast with the abnormality. All reports in the categories of Suspicious abnormality or Highly

suspicious of malignancy should be communicated to the referring physician or his/her designated representative in a manner that assures receipt and documentation of the report, such as by telephone, fax, or certified mail. Federal regulations currently mandate that all women receive a letter from the mammography facility informing them of the results of the examination.

## **DIAGNOSTIC MAMMOGRAPHY AND PROBLEM SOLVING BREAST EVALUATIONS**

Screening mammography is intended to detect unsuspected breast cancer. Diagnostic mammography is intended to provide specific analytic evaluation of patients with clinically detected or screening detected abnormalities. The diagnostic breast evaluation should lead to definitive conclusions about the patient's symptoms or findings to enable specific management recommendations. According to the American College of Radiology Practice Standards, the request for a problem solving breast evaluation is a consultation that will result in a comprehensive imaging evaluation. The patient's history, symptoms and signs, such as breast mass, nipple discharge, pain, or dimpling of the skin; findings on physical examination; and results of prior screening mammography, if performed, will focus the diagnostic breast evaluation. Most often a problem solving breast evaluation will consist of diagnostic mammography which will include special views, such as spot compression images or magnification views to localize and characterize a breast abnormality. If clinically requested, a diagnostic mammogram may be supplemented by other procedures such as breast ultrasound, ductography, image guided fine needle aspiration, large core needle biopsy, scintimammography, or MRI to complete the diagnostic assessment. Diagnostic breast evaluations are performed under the direct onsite supervision of an interpreting physician qualified in mammography. As breast imaging and percutaneous diagnostic methods have evolved in recent years, the number of diagnostic options have increased in number and become more complex, which makes it difficult for the referring clinician to predict in advance which breast imaging test would be more appropriate. The mammographer can determine the appropriate sequence of imaging evaluation in a timely and cost effective manner, often completing the diagnostic evaluation in one, or occasionally, two visits. This spares the patient and the referring clinician the burden of scheduling different breast examinations on multiple days, frequently with different radiologists, and results in improved patient compliance. Patients who are forced to undergo prolonged evaluations frequently become dissatisfied and may discontinue the work up and be lost to follow up. This can result in serious consequences for the patient because of delayed diagnosis and increases the medical legal risk to health care providers.

It should be emphasized that diagnostic imaging evaluations are a compliment to the physical examination of the breast, NOT a replacement. This is because a small number of palpable cancers will be occult or poorly demonstrated on breast imaging studies. All patients deserve a careful and thorough breast physical examination by an experienced physician or nurse practitioner prior to breast imaging evaluation.

### **Biopsy of breast lesions**

Historically suspicious breast lesions have been surgically excised for diagnosis. Surgical excision of malignant breast lesions is still mandatory, but these days the great majority of breast lesions are amenable to percutaneous biopsy for diagnosis. As of 1995-96 about two thirds of breast lesions in Hawaii were biopsied through the skin. This percentage continues to rise and will likely reach 80-95 % of diagnostic breast biopsies in the future. In expert hands stereotaxic biopsy can rival the accuracy of open surgical biopsy (96-100%). Newer techniques such as mammotomy usually result in the complete resection of lesions less than one centimeter, further decreasing the chance of sampling error. When lesions are completely removed, or when a definitive benign diagnosis such as fibroadenoma is obtained, the patient can be followed by annual mammography. When the biopsy is benign but there is a small theoretic chance of sampling error then the patient can be followed by a six-month mammogram or ultrasound.

There is often a difference in the way that nonpalpable and palpable breast lesions are clinically managed in the U.S. Palpable lesions can usually be most cost effectively biopsied by surgeons without imaging guidance. Several nationwide practice reviews have shown that many clinicians directly refer patients with suspicious nonpalpable breast lesions for image guided biopsy through the skin. However, when clinically indicated or when desired by the patient, surgical consultation is encouraged. Surgical consultation is particularly appropriate for patients with palpable dominant breast masses and BIRAD category 5 lesions identified on imaging studies (as these lesions are likely to be malignant). This is because physical examination of the patient after a biopsy may be more difficult and establishing continuity of care is important in patients with cancer. Percutaneous fine needle aspiration or core biopsy of clinically palpable lesions can often be more performed without imaging guidance. When the imaging specialist performs percutaneous biopsy, ultrasound should be considered if a mammographic lesion is ultrasonically visible, because this is more cost effective.

## INDICATIONS AND UTILIZATION OF DIAGNOSTIC IMAGING EXAMINATIONS

**Diagnostic mammography** is the only breast imaging technique, which can reliably detect the microcalcifications, which are associated with about half of all breast cancers. Mammography is also able to define the margins of many breast masses. Mammography is the most sensitive when patients have breasts that are largely of fatty density. Mammography cannot differentiate between solid and cystic masses and may be insensitive to masses when the breast tissues are mammographically dense (largely of water density). Certain breast lesions may be positioned too posteriorly or marginally to be included in standard CC and MLO mammographic views. In general, diagnostic mammography is the initial diagnostic test of choice in women over age 35 and often is the only examination needed to evaluate a finding on screening mammography.

**Breast Ultrasound** is the initial imaging test of choice to evaluate masses in younger women, especially under age 30, and in lactating and pregnant patients. Breast ultrasound should be considered part of a diagnostic breast evaluation of palpable or ambiguous mammographic masses or focal asymmetric densities, which may represent or mask a mass. The breast ultrasound should be directly correlated to the area of concern.

on the mammogram or physical examination. If a palpable mass is present, its location should be clearly discussed or the general area diagrammed on the clinical request for the examination. Ultrasound is not a screening study and is not a standard technique to search for microcalcifications. Ultrasound is able to demonstrate many mammographically occult cancers and has been shown to be nearly 90% sensitive for the detection of infiltrating lobular carcinoma, which is frequently difficult to see on mammograms. Ultrasound is also an excellent method to diagnose breast cysts. Ultrasound may be helpful in reinforcing the clinical impression that a palpable lump is benign, especially if the ultrasound demonstrates typically benign ultrasonic findings such as cysts, intramammary lymph nodes, well-circumscribed fibroadenomas, or echogenic ridges of benign appearing fibroglandular tissue which directly correspond to the areas of palpable concern.

**Ductography** is a useful technique to evaluate bloody or clinically suspicious nipple discharges. Ductography is performed by injecting dye through a small cannula into the suspect duct. Filling defects or obstruction of the ductal system may be an indication for biopsy or surgical dissection.

**Scintimammography** is a FDA accepted examination, which has been shown to be about 85-95% sensitive to the detection of palpable breast carcinomas. Scintimammography is useful for evaluation of masses, which measure at least 1 or 2cm in size with smaller lesions usually being below its level of resolution. Scintimammography may be helpful in a small minority of patients when standard breast imaging tests, such as mammography or ultrasound, are indeterminate.

**Breast MRI** is the most sensitive imaging examination for invasive breast carcinoma with the possible exception of PET. Numerous studies have shown that the sensitivity of MRI for invasive breast carcinoma is 96-100%. The test is less sensitive for the detection of DCIS. In recent years, the specificity of MRI for breast cancer has improved to about 85% in comparison to the specificity rate of mammography, which is about 25-35%. MRI is useful in evaluating implants and in a small minority of problematic patients undergoing diagnostic breast evaluation.

In conclusion, the diagnosis and treatment of breast cancer requires a cooperative effort between the patient, her physician, and radiology and surgical consultants. In general, patient care is better when the patient is fully informed about available options and when the patient is managed with a team approach. This will become even more important in the future as a growing majority of patients are diagnosed with percutaneous techniques and other advanced diagnostic and surgical techniques, such as sentinel node imaging, become more common.

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